De grondslagen van de behandeling van diabetes mellitus

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In het laatste hoofdstuk werden een aantal gevallen van de verschillende categorieën van patiënten besproken en in diagrammen grafisch voorgesteld.

SUMMARY

The object of this study was to trace which results were reached with the treatment of 394 diabetes mellitus patients and which factors were important for the results.

As material for our research were used the data of the diabetes mellitus patients treated between 1930 and 1944 in the clinic for internal diseases of the St. Elisabeth Hospital at Tilburg.

In Chapter I a summary was given about the development of the treatment of diabetes mellitus in the course of ages. Already 700 B.C. diabetes was treated with undernutrition and purging.

In the 19th century Bouchardat, Naunyn, von Noorden and others introduced a severe restriction of carbohydrate.

Allen highly improved the treatment by diets poor in calories, as according to him not only the carbohydratemetabolism with diabetes, but the total metabolism suffered.

Allen reached favourable results with these diets. In his experiments with animals he saw an improvement in tolerance and a recovery of the β-cells of the islands of Langerhans, at first degenerated, in treating his animals which were made diabetic, with a diet of undernutrition.

The various other methods of treatment were dealt with briefly. So we saw the treatments with carbohydrates of von Noorden, of During and Falta and the diets poor in protein and rich in fat of Petren, Newburgh, Marsh and Maignon reviewed.

After the discovery of the insulin by Banting and Best the prognosis of the diabetes thouroughly improved.

At first the patients were still treated with diets poor in carbohydrates and poor in calories, with insulin only in emergency cases, but soon the diets richer in carbohydrates were introduced completed with insulin. (Adlersberg and Porges, Geyelin, Rabinowitch, Gray and Sansum, Richardson, Bang.)

After 1936 much was undertaken to get insulincompositions able to keep the bloodsugarlevel in a normal state during the whole 24 hours. Successively were found the protamin insulin, the protamin-zinc-insulin, the globin- and histon-insulin and various mixtures of these. As the latest acquisition the so called di-insulin. Till 1939 the general endeavours of the experts on diabetes were to treat the patients so that they achieved normal bloodsugarvalues and urine, though most of them maintained a slight glucosuria as a precautionary measure against hypoglycaemic reactions.

Bertram, Brentano, Tolstoi, Gerritzen and others diverged much further from this. They thought a highly positive carbohydrate balance of more importance than a normal bloodsugarlevel.

In Chapter II our material was discussed.

This material consisted of 246 women and 148 men, 62 per cent and 38 per cent respectively.

The distribution of the various ages of the patients was checked.

Of the total number of our patients 170 of them proved to have acquired diabetes before the age of 50, (43,2 per cent) and 224 after the age of 50 (56,8 per cent). It proved that the illness appeared, as far as men are concerned, more before the age of 50 than after. viz. 54 and 46 per cent respectively. For the women the figures were 35 and 65 per cent respectively, so that the diabetes appeared more after the age of 50, as far as our female patients are concerned.

The majority of our patients came for treatment within a year after the illness came to light.

In 43 or 10,9 per cent of the cases there were diabetic patients amongst the next of kin.

The symptoms which occurred most frequently were thirst, polyuria, emaciation, tiredness, hunger, furunculosis.

Hypertension occurred in 50 per cent of the cases; mostly with the women, viz. 61 per cent of the total number of the women.

We saw cholelithiasis 25 times (with women only), angina pectoris 7 times, pancreatitis 3 times, tuberculosis of the lungs 6 times. 52,2 per cent of our patients had a weight of more than 5 per cent over normal. Hypoglycaemic coma appeared in only 3 cases. Praecoma and coma diabeticum together in 18 cases. 12 of these patients came in treatment for the first time, being in comatic condition.

Chapter III deals with a short summary of the treatment of our patients. The primary purpose to be obtained was to normalise the bloodsugarlevel and the urine as quickly as possible by prescribing a diet, completed with insulin, if need be. The diets had to be so that the patients could not acquire an overweight. Thin people got a larger diet than stout patients. We started with a standardised diet, later extended, if necessary. The patients were controlled regularly and we tried to keep the bloodsugar-value normal and the urine free from glucosis and acetone.

In Chapter IV the results of the treatment of 321 patients having been in treatment a reasonable time, were discussed. The rest of the patients were treated for too short a time for drawing a conclusion. These patients were divided in 3 large categories, according to the results attained.

Category I comprises the patients of whom the tolerance "improved". This category contains 183 patients or 57 per cent of the total number of patients reviewed.

This category was divided in:

1. the patients showing such an improvement in tolerance that they finally did not need any insulin. (70 cases or 21,85 per cent.)
2. the patients for whom the tolerance improved to such an extent that finally they needed much less insulin than before. (64 cases or 19,95 per cent.) and
3. the patients treated with a diet only, which could be increased in the course of the treatment, thus meaning an improvement in tolerance as well. (49 cases or 15,25 per cent.)

Category II contained the patients for whom the tolerance neither improved nor deteriorated; therefore here the tolerance remained the same during the course of the treatment, i.e. the quantity of insulin necessary at the end of the treatment was about the same as in the beginning. This category contains 42 patients = 13,05 per cent.

Category III consists of a number of patients with whom the condition deteriorated, i.e. these patients finally needed more insulin than in the beginning of the treatment. This category contains 96 patients = about 30 per cent.

This category is subdivided again, viz. in patients who never showed an improvement in tolerance, in the sense of a decreased need of insulin (67 patients = 20,85 per cent) and the patients showing a temporary improvement of tolerance, annihilated later on. ("Inclined to improve" viz. 29 patients = 9,05 per cent.)

The majority of our patients showed, therefore, a distinct improvement of tolerance. (57 per cent.)

We now ascertained why part of the patients showed an improvement in tolerance and an other part remained the same or even deteriorated.

It proved that in category I the "improved" patients always had a normal bloodsugarlevel and an urine free from glucosis and acetone.

This was not the case in categories II and III. In category II it occurred that there were times of normal bloodsugarlevels and normal urine, but this was annihilated later on.

The majority of the "deteriorated" patients — category III — showed no lasting periods of normal bloodsugarvalue and normal urine, with the exception of patients showing a temporary tendency of improvement, but later on these periods were annihilated with these patients so that finally they needed more insulin than before.

The causes of this increase or decrease in the tolerance of our patients was investigated.

It proved that the "improved" patients always stuck to their diet well; moreover they injected in the right way, by which their condition improved.

This was not the case in categories II and III with a greater part of the patients of these categories. In table 10, 11 and 12 the causes are

shown by which no improvement of tolerance was obtained with the patients of category II and III.

The most important causes proved to be:
not sticking to the diet
injecting the insulin badly
coming for control irregularly or
a combination of these causes.

Of the 138 patients not showing an improvement in tolerance with 98 of them the cause was due to their own fault by neglecting the prescribed rules. The other 40 patients not showing any improvement of tolerance could impute this to various causes through no fault of themselves, e.g. to infections (tuberculosis and other) hyperthyreoidy, traumata a.s.o. For part of these 40 patients no cause could be traced.

The conclusion from the results obtained was that the primary object of the treatment of diabetes mellitus should be: fighting the hyperglycaemia and the glucosuria as quickly and as efficiently as possible and continually keeping the bloodsugarlevel under 0,180—0,200 gr. %.

In Chapter V these conclusions were checked with the experiments on animals made diabetic.

With the animals made diabetic by removing a part of the pancreas a hydropic degeneration of the β-cells of the islands of Langerhans was stated, parallel to the appearance of hyperglycaemia. It was possible to cancel these degenerative deviation by having the animals fasting or putting them to a diet poor in carbohydrates and calories, so that the bloodsugarlevel grew normal again. In continuing this an improvement in tolerance was achieved.

An improvement in tolerance could be seen as well by treating these animals with insulin before the degenerative deviation had become irreversible.

By artificially increasing the bloodsugarlevel by administring intravenous glucose continually a hydropic degeneration of the β-cells of the islets of Langerhans, parallel to the hyperglycaemia caused herewith, could be seen as well.

Further the causing of diabetes mellitus by injections of anterior pituitary extract was investigated thoroughly and the theories were discussed which deal with the essence of this form of diabetes.

With these animals made diabetic in this way the diabetes was treated in various ways, and with all these methods, together with the annihilation of the hyperglycaemia the recovery of the degenerated β-cells of the islands of Langerhans and the appearance of an improvement in tolerance was seen. As a method to attain this were used: diets poor in carbohydrate and calories, furthermore injections of insulin and phlorizin.

A comparison was made between the effect of the insulin and the phlorizin. It proved that these two agents differed in every respect, with

one exception, viz. the annihilation of the hyperglycaemia. Further experiments with pituitary diabetes proved that, if no hyperglycaemia occurred, there was no degeneration of the islands of Langerhans either.

These experiments in accordance with the clinical results confirmed the view that the fighting of the hyperglycaemia, is of foremost importance, whatever the cause of the hyperglycaemia may be, and this as soon as possible, before the damage of the islands of Langerhans by the hyperglycaemia is advanced too far.

With juvenile patients the results were often enough not so favourable,

1. because they often did not stick to their diet,
2. if they are not treated soon after the outbreak of the illness so that the hyperglycaemia is annihilated, there is a chance that the islands of Langerhans have changed already irreversibly; this threatens especially with this category of young patients because it regards serious cases, where only few well functioning islands of Langerhans are still available,
3. if the diabetes is serious, there is a chance that so little of the functioning texture is left that no improvement of the function can be anticipated any more, so that these patients have to live entirely on the injected insulin.

With the human being it is of course not so easy as with experiments on animals to state how the influence of the insulin and the measures of the diet work on the islands of Langerhans, but the improvement in tolerance gives an indication for this. Moreover at present, as opposed to formerly, distinct degeneration of the β-cells of the islands of Langerhans has been stated in the pancreasglands of patients died of diabetes.

Our own results reached show clearly the importance of the effective elimination of the hyperglycaemia and the glucosuria.

In the last Chapter a number of cases of the various categories of patients were dealt with and shown in diagrams.